

HW 23

Atomic Physics Problems

AP Physics

1. Which colored light bulb emits photons with the least energy: red, orange, yellow, green, or blue? Why? Which emits the most energy? Why?
2. In the photoelectric effect, suppose that the intensity of the light is increased, while the frequency is kept constant. The frequency is greater than the minimum frequency f_0 . State whether each of the following will increase, decrease, or remain constant, and explain your choice:
 - a. the current in the phototube
 - b. the number of electrons emitted per second from the metal surface
 - c. the maximum kinetic energy than an electron could have
 - d. the maximum momentum that an electron could have
 - e. the minimum de Broglie wavelength that an electron could have
3. Ultraviolet light is responsible for sun tanning. Find the wavelength (in nm) of an ultraviolet photon whose energy is 8.0×10^{-19} J.
4. The maximum wavelength that an electromagnetic wave can have and still eject electrons from a metal surface is 460 nm. What is the work function W_0 of this metal? Express your answer in electron volts.
5. Two photons have energies of 3.3×10^{-25} J and 1.3×10^{-10} J. Identify the appropriate region in the electromagnetic spectrum for each of these photons (radio waves, infrared, visible light, ultraviolet, x-rays, gamma rays).